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फार्क-लिफ्ट ट्रक — फार्क आर्म —  
तकनीकी विशेषताएँ एवं परीक्षण  
( दूसरा पुनरीक्षण )

**Fork-Lift Trucks — Fork Arms —  
Technical Characteristics  
and Testing**  
( *Second Revision* )

ICS 53.060

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## FOREWORD

This Indian Standard ( Second Revision ) was adopted by the Bureau of Indian Standards, after the draft finalized by the Transport Tractors, Trailers and Industrial Trucks Sectional Committee and approval of the Transport Engineering Division Council.

This standard was prepared as a guide for testing the suitability of fork to be used in forklift trucks and the principal dimensions were prepared to promote interchangeability and was published in 1983.

This standard was originally published in and subsequently revised in 2003. First revision of this standard was undertaken to bring it in line with ISO 2330 : 2002 'Fork-Lift trucks — Fork arms — Technical characteristics and testing', issued by International Organization for Standardization (ISO). In the first revision certain tests were added such as yield test, impact test, fatigue test and surface crack detection. Marking clause was also elaborated. This revision is being taken up to incorporate the references of latest standards for various tests and requirements and introduction of new alloy materials.

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

## *Indian Standard*

# FORK-LIFT TRUCKS — FORK ARMS — TECHNICAL CHARACTERISTICS AND TESTING

*(Second Revision)*

## 1 SCOPE

**1.1** This Indian Standard specifies manufacturing, testing and marking requirements for solid-section fork arms or quantity production and with all types of mounting. These include but are not limited to hook, shaft or pin, bolt-on and roller type fork arms.

**1.2** By agreement between the fork arm manufacturer and the purchaser, these requirements may also be applied to fork arms not intended for quantity manufacture.

## 2 REFERENCES

The standards listed below contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to or revisions of, any of these publications do not apply. However, parties to agreements based on this Indian Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

<i>IS No./ Other Publication</i>	<i>Title</i>
1757 (Part 1) : 2014/ ISO 148-1 : 2009	Metallic materials — Charpy pendulum impact test: Part 1 Test method
ISO 683-1 : 2016	Heat-treatable steels, alloy steels and free-cutting steels — Part 1: Non-alloy steels for quenching and tempering
7525 : 2017/ ISO 2328 : 2011	Fork-lift trucks — Hook-on type fork arms and fork arm carriages — Mounting dimensions
7570 : 1975/ ISO 2331 : 1974	Glossary of terms relating to fork arms and attachments of fork lift trucks

## 3 TERMS AND DEFINITIONS

For the purposes of this standard, the terms and definitions given in ISO 7570 and the following shall apply.

**3.1 Prototype Fork Arm** — Fork arm intended for quantity production where any combination of the blade, shank cross-section, material specification, hook or fork heel design is new to production

## 4 MANUFACTURE

The fork arms shall be manufactured from material of solid cross-section.

## 5 TESTING

**5.1** A prototype fork arm shall be subjected to and meet the requirements of, the yield test as given in 6 and the impact test in 7. Prototype fork arms each having a specified capacity not greater than 4 000 kg and a load centre not greater than 4 000 kg × 600 mm shall be subjected to, and meet the requirements of, the fatigue test in 8.

**5.2** The tests given in 6 and 7 may, by agreement between the fork arm manufacturer and the purchaser, be repeated periodically for quantity production fork arms.

## 6 YIELD TEST

### 6.1 Test Load

**6.1.1 Fork Arms each of Specified Capacity up to and Including 5 500 kg**

The test load  $FT$  shall correspond to three times the specified capacity  $C$  of the fork arm.

**6.1.2 Fork Arms each of Specified Capacity Greater than 5 500 kg**

The test load  $F_T$  shall correspond to the specified capacity  $C$ , expressed in kilograms, of the fork arm multiplied by the safety factor  $R$ , where  $R$  is given as follows:

$$R = 3 - 0.08 (Q - 10)$$

Where,

$$R \geq 2.5$$

$$Q = \frac{2C}{1000}$$

## 6.2 Procedure

**6.2.1** Restrain the fork arm in a manner identical to that used on the fork-lift truck. Fit the fork arm with a means of measuring any permanent deformation.

**6.2.2** Apply the appropriate yield test load twice at the distance  $D$  from the front face of the fork arm shank (see Fig. 1), gradually and without shock; maintain it for 30 s each time. For fork arms each of specified capacity below 5 500 kg and a load centre of 5 500 kg  $\times$  600 mm,  $D$  shall be taken as the appropriate rated load centre distance as specified in Table 1 of IS 7525. For fork arms each of specified capacity of 5 500 kg and above and a load centre of 5 500 kg  $\times$  600 mm,  $D$  shall be specified by the truck manufacturer.

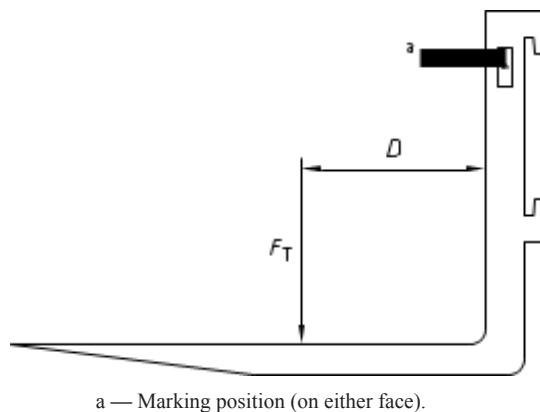


FIG. 1 MARKING POSITION AND TEST LOADS  
APPLICATION POSITION

## 6.3 Requirement

Datum readings shall be taken on the top surface of the fork blade tip after the first test and again after the second test. Comparison between these two readings shall indicate no permanent deflection.

## 7 IMPACT TEST

### 7.1 Sampling

Specimens longitudinal to the grain shall be taken in relation to the fork arm section in accordance with the location of test pieces in bars and wire rods specified in ISO 683-1. These shall preferably be taken from an area between the top and bottom hooks, but it is also permissible to take specimens from a specially provided extension of the fork shank above the top hook or from a separate piece of semi-finished material of adequate size (that is, length at least twice the width), which has the same cross-section, taken from the same material batch and received the same heat treatment as the fork arm itself.

## 7.2 Procedure

Carry out the impact tests in accordance with IS 1757 (Part 1) using standardized V-notched samples at a temperature of  $-20^{\circ}\text{C}$ .

## 7.3 Requirement

The samples shall achieve an impact value of at least 27 J at  $-20^{\circ}\text{C}$ .

## 8 FATIGUE TEST

### 8.1 Test Load Magnitude, Frequency and Duration

**8.1.1** The dynamic test load shall be of constant amplitude and have a peak magnitude of 1,25 times the specified capacity  $C$ . The minimum value for the dynamic test load shall not exceed 0.1 times the specified capacity  $C$ .

**8.1.2** The test load frequency shall be maximum 10 Hz. The frequency shall be reduced if the temperature of the fork arm exceeds  $50^{\circ}\text{C}$  or if resonance symptoms occur.

**8.1.3** The duration of the test shall be not less than 106 test load cycles.

### 8.2 Procedure

Restrain the fork arm in a manner identical to that used on the fork-lift truck. Apply the dynamic test load at the distance from the front face of the fork arm shank where  $D$  is as specified in 6.2 (see Fig.1).

### 8.3 Requirement

There shall be no cracks or permanent deformation in the fork arm on completion of the test. The crack detection procedure shall be as specified in 9.

## 9 SURFACE CRACK DETECTION

The fork arm manufacturer shall thoroughly visually examine every fork arm in quantity production (or following a fatigue test) for cracks, and subject them to a non-destructive crack detection process with special attention being given to the heel and any welds and heat-affected zones at the top and bottom hooks, including their attachment to the shank. The fork arm shall be withdrawn, if indications of cracking are detected.

NOTE — It is recommended that the non-destructive crack detection process be carried out by the magnetic particle inspection method.

## 10 MARKING

**10.1** At the position indicated in Fig. 1 (on either face), each fork arm shall be marked permanently with the following:

- a) Specified fork arm capacity  $C$ , in kg;

- b) Specified load centre distance  $D$ , in mm;
- c) Fork arm manufacturer's identification; and
- d) Week or month and year of manufacture or agreed serial number.

**10.2** The truck manufacturer's identification and part number may be shown, if requested.

### **10.3 BIS Certification Marking**

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the products may be marked with the standard mark.





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### Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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